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U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION X

IDAHO OPERATIONS OFFICE
422 WEST WASHINGTON STREET
BOISE, IDAHO 83702



June 15, 1987

I00

MEMORANDUM

SUBJECT: Permit Reissuance; ID-002540-2
Cyprus Thompson Creek

FROM: Wally Scarburgh, *Wally*
NPDES Permits Coordinator, I00

TO: Roger Mochnick, Chief
Water Permits Section, WD-134

Attached for your review are the Fact Sheet, Public Notice, Draft Permit and supporting attachments for the Cyprus Thompson Creek permit reissuance.

Attachments

cc: Larry Koenig, IDHW-DOE, Boise

BN044B

United States Environmental Protection Agency
Region 10
Park Place Building, 13th Floor
1200 Sixth Avenue, WD-134
Seattle, Washington 98101
(206) 442-1214

NOTICE OF PROPOSED REISSUANCE OF A NATIONAL POLLUTANT
DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO
DISCHARGE TO WATERS OF THE UNITED STATES

and

NOTICE OF STATE CERTIFICATION

Public Notice No.: ID-002540-2

Public Notice Issuance Date:

Public Notice Expiration Date:

1. Applicant:

Cyprus Thompson Creek
P.O. Box 62
Clayton, Idaho 83227

Permit No.: ID-002540-2

The applicant (Cyprus) owns and operates an open pit molybdenum mine and concentration mill (SIC 1061) located 35 miles southwest of Challis, Idaho, in Custer County. Process wastewater is contained in a tailings impoundment, and discharges consist of mine drainage from waste rock dumps and stormwater runoff from the mine access road.

2. Tentative Determination

The Region 10 Office of the Environmental Protection Agency (EPA) has tentatively determined to reissue a discharge permit to the above listed applicant.

3. State Certification

This Notice will also serve as Public Notice of the intent of the State of Idaho, Department of Health and Welfare to consider certifying that the subject discharge will comply with the applicable provisions of Sections 208(e), 301, 302, 303, 306 and 307 of the Clean Water Act. The NPDES permit will not be issued until the certification requirements of Section 401 have been met.

4. Public Comments

Persons wishing to comment on the tentative determinations contained in the proposed permit or wishing to request that a public hearing be held, may do so in writing, within 30 days of the date of this public notice. A request for a public hearing shall state the nature of the issues to be raised as well as the requester's name, address and telephone number. Comments must be received within this 30 day period to be considered in the formulation of final determinations regarding the application. All comments should include the name, address and telephone number of the commenter and a concise statement of the exact basis of any comment and the relevant facts upon which it is based.

All written comments and requests should be submitted to EPA at the above address to the attention of the Director, Water Division.

Persons wishing to comment on State Certification should submit written comments within this 30 day period to the State of Idaho, Department of Health and Welfare, Statehouse, Boise, Idaho 83720.

5. Administrative Record

The proposed NPDES permit and other related documents are on file and may be inspected and copies made at the above address any time between 8:30 a.m. and 4:00 p.m., Monday through Friday. Copies and other information may be requested by writing to the EPA at the above address to the attention of the Water Permits Section, or by calling (206) 442-1214. This material is also available from the EPA Idaho Operations Office, 422 West Washington Street, Boise, Idaho 83702. A copying machine is available in the Seattle office for public use at a charge of 20 cents per copy sheet. There is no charge if the total cost is less than 25 dollars.

Permit No.: ID-002540-2
Application No.: ID-002540-2

United States Environmental Protection Agency
Region 10
Park Place Building, 13th Floor
1200 Sixth Avenue, WD-134
Seattle, Washington 98101

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. §1251 et seq; the "Act"),

CYPRUS THOMPSON CREEK
P.O. BOX 62
Clayton, Idaho 83227

is authorized to discharge from a facility located 35 miles southwest of Challis, Idaho, to receiving waters named Thompson Creek, in accordance with discharge point(s), effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective

This permit and the authorization to discharge shall expire at midnight,

Signed this day of

Director, Water Division, Region 10
U.S. Environmental Protection Agency

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I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

A. Specific Limitations and Monitoring Requirements.

1. During the period beginning on the effective date of this permit, and lasting until the expiration date, discharges from outfalls #001 and #002 shall be limited and monitored by the permittee as specified below:

<u>Effluent Parameter</u>	<u>Discharge Limitation</u>		<u>Monitoring Requirements</u>	
	<u>Daily Avg. (mg/l)</u>	<u>Daily Max. (mg/l)</u>	<u>Frequency</u>	<u>Sample Type</u>
Flow	----	----	Daily	----
Suspended Solids (TSS)	20	30	Weekly	Grab
Arsenic	1.9	3.6	Monthly	Grab
Cadmium	0.05	0.1	Monthly	Grab
Lead	0.3	0.6	Monthly	Grab
Mercury	0.00012	0.002	Monthly	Grab
Copper	0.12	0.18	Monthly	Grab
Zinc	0.47	1.5	Monthly	Grab

2. The pH shall not be less than 6.0 standard units, nor greater than 9.0 standard units, and shall be monitored weekly by grab samples.
3. There shall be no discharge of floating solids or visible foam in other than trace amounts.
4. Samples taken in compliance with the monitoring requirements specified above shall be taken in the effluent stream below the settling basins.
5. In addition to the above referenced effluent monitoring, the permittee shall continue to provide for water quality monitoring in accordance with the program agreed upon by the U.S. Forest Service (USFS), Idaho Department of Health and Welfare - Division of Environment (IDHW-DOE) and Cyprus, and such future modifications as may be mutually agreed upon by the parties. Instream monitoring results shall be reported quarterly (in March, June, September and December) to EPA and IDHW-DOE at the address given in Part II.D. below.

B. Definitions.

1. "Daily Average" ("Daily Avg.") shall mean the total units discharged during a monitoring month divided by the number of days in that period that the production or commercial facility was operating. Where less than daily sampling is required by this permit, this average shall be determined by the summation of the measured daily discharges divided by the number of days during the monitoring month when the measurements were made.
2. "Daily Maximum" ("Daily Max.") shall mean the maximum value attained on any day in a given monitoring month.
3. "Monitoring Month" shall mean the period consisting of the calendar weeks which end in a given calendar month.
4. A "Grab" sample is a single sample or measurement taken at a specific time or over as short a period of time as is feasible.
5. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
6. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.
7. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

BN0027E

In order to conserve resources, we are not including the permit boilerplate pages in this preliminary draft package.

Fact Sheet

United States Environmental Protection Agency
Region 10
Park Place Building, 13th Floor
1200 Sixth Avenue, WD-134
Seattle, Washington 98101
(206) 442-1214

Date:

Permit No.: ID-002540-2

PROPOSED REISSUANCE OF A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE POLLUTANTS PURSUANT TO THE PROVISIONS OF THE CLEAN WATER ACT

CYPRUS THOMPSON CREEK
P.O. Box 62
Clayton, Idaho 83227

has applied for reissuance of a National Pollutant Discharge Elimination System (NPDES) permit to discharge pollutants pursuant to the provisions of the Clean Water Act. This fact sheet includes (a) the tentative determination of the Environmental Protection Agency (EPA) to reissue the permit, (b) information on public comment, public hearing and appeal procedures, (c) the description of the current discharge, (d) schedules of compliance and other conditions, and (e) a sketch or detailed description of the discharge location. We call your special attention to the technical material presented in the latter part of this document.

Persons wishing to comment on the tentative determinations contained in the proposed permit reissuance may do so by the expiration date of the Public Notice. All written comments should be submitted to EPA as described in the Public Comments Section of the attached Public Notice.

After the expiration date of the Public Notice, the Director, Water Division, will make final determinations with respect to the permit reissuance. The tentative determinations contained in the draft permit will become final conditions if no substantive comments are received during the Public Notice period.

The permit will become effective 30 days after the final determinations are made, unless a request for an evidentiary hearing is submitted within 30 days after receipt of the final determinations.

The proposed NPDES permit and other related documents are on file, may be inspected, and copies made at the above address, at any time between 8:30 a.m. and 4:00 p.m., Monday through Friday. Copies and other information may be requested by writing to EPA at the above address to the attention of the Water Permits Section, or by calling (206) 442-1214. This material is also available from the EPA Idaho Operations Office, 422 West Washington Street, Boise, Idaho 83702. A copying machine is available in the Seattle Office for public use at a charge of 20 cents per copy sheet. There is no charge if the total cost is less than 25 dollars.

I. Applicant

Cyprus Thompson Creek
P.O. Box 62
Clayton, Idaho 83227

NPDES Permit No.: ID-002540-2

II. Facility Location and Activity

The applicant (Cyprus) owns and operates an open pit molybdenum mine and concentration mill (SIC 1061) located 35 miles southwest of Challis, Idaho, in Custer County (Attachments #1 and #2). Process wastewater is contained in a tailings impoundment, and discharges consist of mine drainage from waste rock dumps (#001 and #002) and stormwater runoff from the mine access road (#003).

III. Receiving Water

The mine site is drained by Thompson and Squaw Creeks, tributaries of the Salmon River (Attachment #2). Both drainages are classified by the State of Idaho for designated uses as agricultural water supply, secondary contact recreation and habitat for cold water biota and salmonid spawning. The Salmon River, at the points of confluence with Thompson and Squaw Creeks, has been classified as a Special Resource Water (Idaho Water Quality Standards and Wastewater Treatment Requirements, 1985, Section 1-2130).

IV. Background

The mine is located on property managed by the U.S. Forest Service (USFS), Challis National Forest. An Environmental Impact Statement (EIS) was published by the USFS on October 31, 1980. The selected alternative was that proposed by Cyprus and consisted of waste dumps located around the mine pit, and a "no discharge" tailings impoundment located in the upper Bruno Creek watershed.

An NPDES permit application was submitted by the company on April 14, 1980, for discharge of mine drainage into Pat Hughes and Buckskin Creeks, both of which are tributaries of Thompson Creek. A permit was issued effective June 10, 1981, which expired on June 10, 1986. An application for permit reissuance was submitted on December 19, 1985. Due to uncertainties in the molybdenum market and a pending mine closure, the terms of the expired permit were continued in accordance with the Administrative Procedures Act [5 U.S.C. 558(c)]. On December 6, 1986, Cyprus announced a new mining plan based on an approximate 45% reduction in milling operations in hopes of assuring continued operation of the mine for an additional 3-5 years.

V. Basis for Permit Limitations

The Cyprus tailings impoundment is located at the headwaters of Bruno Creek, a tributary of Squaw Creek. Containment of mill tailings is

accomplished by diversion of Bruno Creek headwaters and a seepage pump back system. Although there are no effluent limitations proposed for this closed system, a water quality monitoring program outlined in the following sections has been implemented to quantify potential impacts from impoundment seepage.

Discharges of mine drainage from waste rock disposal areas enter two small intermittent tributaries to Thompson Creek; Buckskin Creek and Pat Hughes Creek. In-stream settling ponds have been constructed in both drainages, and are designed and maintained to provide for 24-hour detention of normal spring flows, in addition to a 10-year, 24-hour storm event. Previous permit conditions established suspended solids (TSS) and pH limitations, in addition to quarterly effluent monitoring requirements for cadmium, copper, zinc and arsenic. The permit also required turbidity monitoring at selected stations to verify compliance with State Water Quality Standards.

On December 3, 1982, EPA promulgated effluent guidelines for the Ore Mining and Dressing Point Source Category. 40 CFR Part 440 (Subpart J) established specific technology based limitations for molybdenum mining and milling. Section 301 of the Clean Water Act requires that more stringent water quality based limitations be applied when the application of effluent guidelines would interfere with the attainment or maintenance of existing water quality standards. In order to establish effluent limitations for the subject permit, EPA considered existing water quality data, discharge Monitoring Reports (DMRs) submitted by the company, promulgated effluent guidelines, State Water Quality Standards and EPA Quality Criteria for Water (1986) for fresh water biota. Receiving water monitoring and DMR data are summarized on Attachment #4, and Attachment #5 compares applicable Best Available Treatment (BAT) effluent guidelines limitations with water quality based criteria for toxic metals.

Outfalls #001 and #002 (Mine Drainage)

The Cyprus tailings impoundment is located at the headwater of Bruno Creek, a tributary of Squaw Creek. Containment of mill tailings is accomplished by diversion of Bruno Creek headwaters and a seepage pump back system. Although there are no effluent limitations proposed for this closed system, a water quality monitoring program outlined in the following sections has been implemented to quantify potential impacts from impoundment seepage.

Discharge volumes from outfalls #001 and #002 are not limited since flows from the in-line settling ponds vary with seasonal and climatic conditions and are not controlled by the permittee. Flows from outfall #001 typically occur during the spring and early summer during snowmelt, while discharges from outfall #002 usually occur year round. Discharge and receiving water flows were used to establish water quality based effluent limitations. Flow data summarized on Attachment #4 show maximum flow periods to be the limiting basis for dilution calculations, as discharges are either nonexistent or minimal during periods of receiving water low flows. Application of these worst case

flow conditions results in a conservative 10:1 dilution factor used in calculating water quality based toxic effluent limitations. Chronic and acute toxicity criteria (EPA, 1986) are used as the basis for calculating daily average and daily maximum effluent limitations for arsenic, cadmium, lead, mercury, copper and zinc. Attachment #3 summarizes proposed effluent limitations based on comparison of effluent guidelines (40 CFR Part 440.103), and the following water quality based limitations:

Arsenic:

Chronic LOEL = $0.19 \text{ mg/l} \times 10 = 1.9 \text{ mg/l}$ daily average
 Acute LOEL = $0.36 \text{ mg/l} \times 10 = 3.6 \text{ mg/l}$ daily maximum

Cadmium:

Chronic LOEL = $0.011 \text{ mg/l} \times 10 = 0.11 \text{ mg/l}$ daily average
 Acute LOEL = $0.039 \text{ mg/l} \times 10 = 0.39 \text{ mg/l}$ daily maximum

Lead:

Chronic LOEL = $0.032 \text{ mg/l} \times 10 = 0.32 \text{ mg/l}$ daily average
 Acute LOEL = $0.082 \text{ mg/l} \times 10 = 0.82 \text{ mg/l}$ daily maximum

Mercury:

Chronic LOEL = $0.000012 \text{ mg/l} \times 10 = 0.00012 \text{ mg/l}$ daily average
 Acute LOEL = $0.024 \text{ mg/l} \times 10 = 0.24 \text{ mg/l}$ daily maximum

Copper:

Chronic LOEL = $0.012 \text{ mg/l} \times 10 = 0.12 \text{ mg/l}$ daily average
 Acute LOEL = $0.018 \text{ mg/l} \times 10 = 0.18 \text{ mg/l}$ daily maximum

Zinc:

Chronic LOEL = $0.047 \text{ mg/l} \times 10 = 0.22 \text{ mg/l}$ daily average
 Acute LOEL = $0.32 \text{ mg/l} \times 10 = 2.67 \text{ mg/l}$ daily maximum

TSS:

Previous permit limitations of 20 mg/l daily average and 30 mg/l daily maximum will be retained in the reissued permit. These limitations are based on effluent guidelines and considered sufficient to assure compliance with water quality standards, based on past monitoring data.

pH:

pH is limited in the range 6.0 – 9.0, and reflects effluent guidelines criteria. Past monitoring data has shown this limitation adequate to protect water quality standards.

Outfall #003 (Mine Access Road Stormwater Diversion)

The permittee will be required to monitor turbidity above and below the Bruno Creek access road stormwater settling ponds, to assure compliance with State Water Quality Standards. This monitoring shall be performed in accordance with requirements of the water quality monitoring program established by the USFS, IDHW-DOE and Cyprus (Attachment #5).

VI. Basis for Monitoring Requirements

The permittee will be required to comply with the following monitoring requirements for outfalls #001 and #002:

<u>Parameter</u>	<u>Frequency</u>
Flow	Daily
pH	Weekly
TSS	Weekly
Arsenic	Monthly
Cadmium	Monthly
Lead	Monthly
Mercury	Monthly
Copper	Monthly
Zinc	Monthly

The above monitoring requirements are considered adequate to characterize the permittee's discharge and are achievable based on previously submitted DMRs. Attachment #4 summarizes DMR data and Thompson Creek receiving water data.

Cyprus Thompson Creek Water Monitoring Program

In addition to the above referenced monitoring, the permittee shall continue to provide for water quality monitoring in accordance with the program agreed upon by the USFS, IDHW-DOE and the permittee. The major areas covered by the water quality plan are as follows:

1. Surface water quality of Thompson and Squaw Creek drainages.
2. Quantity and quality of effluent released from settling ponds on Pat Hughes and Buckskin Creeks.
3. Surface and groundwater quality in the tailings impoundment drainage basin.
4. Quality of groundwater developed as potable sources for workers at the mine site.
5. Fish and invertebrate populations of streams draining the active mine and mill operation areas.

Attachment #5 summarizes this monitoring program.

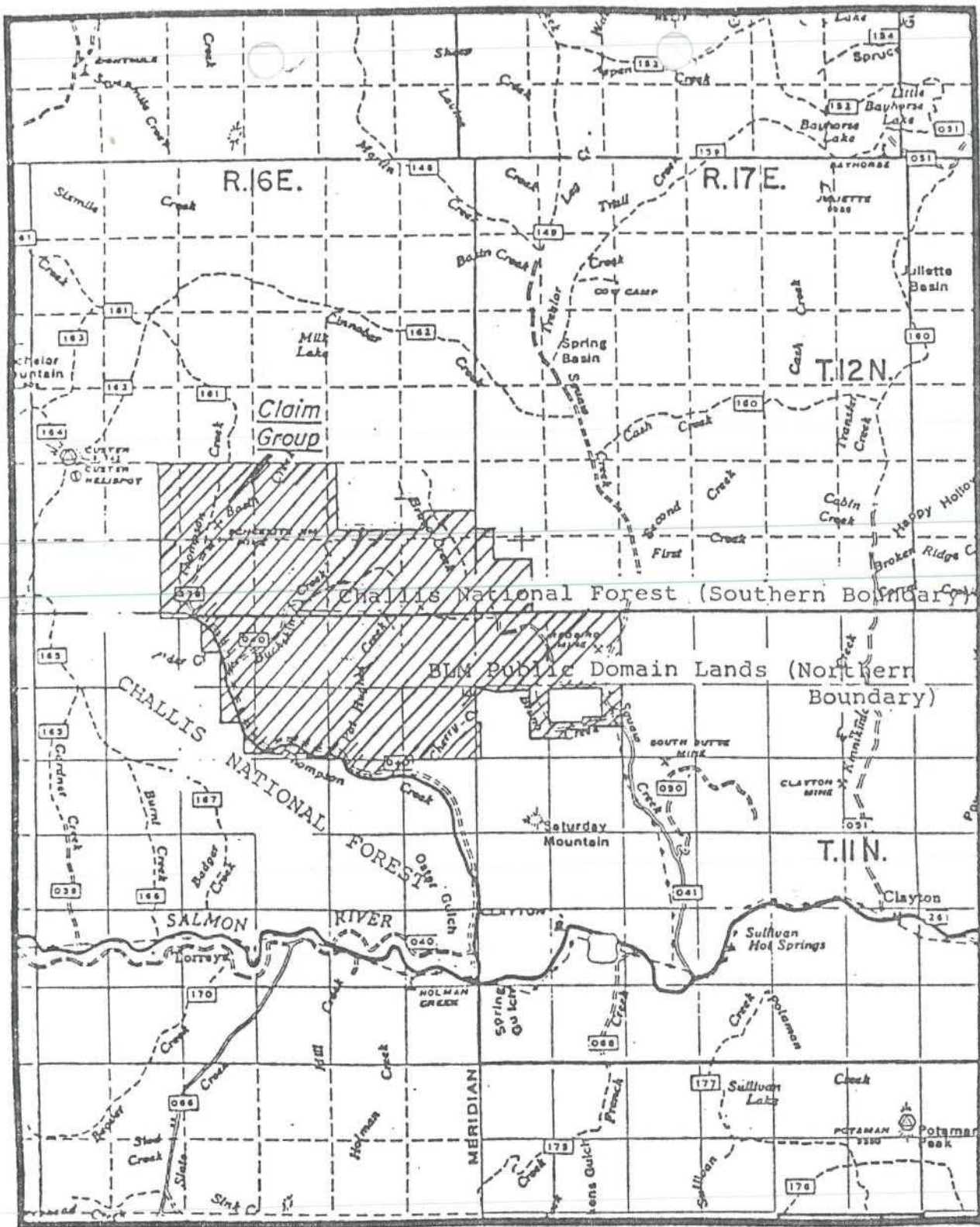
VII. Other Conditions

The permit is proposed to be effective for a period of five (5) years, and subject to modification should monitoring results indicate adverse water quality impacts.

BN0024E

Fig.1 Index map of Idaho showing location of Thompson Creek Project





SCALE

0 2 4 6 Miles

Fig.2 Location of Thompson Creek Project, Custer Co., Idaho

CYPRUS THOMPSON CREEK
TOXIC EFFLUENT LIMITATIONS SUMMARY

<u>PARAMETER</u>	<u>Effluent Guidelines</u>		<u>Chronic LOEL</u>	<u>Toxic LOEL</u>
	<u>(Daily Avg - mg/l)</u>	<u>(Daily Max - mg/l)</u>	<u>X Dilution Factor of 10</u>	<u>X Dilution Factor of 10</u>
Arsenic	N/A	N/A	*1.9	*3.6
Cadmium	*0.05	*0.10	0.11	0.39
Lead	*0.3	*0.6	0.32	0.82
Mercury	0.001	*0.002	*0.00012 (< detectable)	0.24
Copper	0.15	0.30	*0.12	*0.18
Zinc	0.75	*1.5	*0.47	3.2

*Resulting effluent limitation

ATTACHMENT #3

BN0034E

CRYPRUS THOMPSON CREEK
DATA SUMMARY (1981 - 1986)

	Thompson Creek (Upstream)			Buckskin Creek (001)			Pat Hughes Creek (002)			Thompson Creek (Downstream)		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Flow (cfs)				0	9.5	0.6	0	8.6	0.5	4.8	132	24.3
pH	6.6	8.6	7.6	7.6	7.75	7.9	7.7	7.95	8.1	7.0	8.9	7.6
TSS (mg/l)	0	52	6	1.0	57	6.32	1	95	8.1	0	80	8.4
AS (mg/l)	<0.005	0.02	1 + sample	<0.005	0.1		<0.005	0.31		A11	<0.005	
Cd (mg/l)	A11	<0.005		0.001	0.005		0.001	0.005		A11	<0.005	
Pb (mg/l)	A11	<0.05		No data			No data			A11	<0.05	
Hg (mg/l)	<0.0005	0.0015	5 + samples	No data			No data			<0.0005	0.0016	3 + samples
Cu (mg/l)	<0.01	0.02	5 + samples	<0.01	0.01		<0.01	0.01		A11	<0.01	
Zn (mg/l)	0.003	0.044	0.018	0.005	0.54	0.025	<0.01	0.083	0.037	0.001	0.028	0.016

ATTACHMENT #4

RECEIVED

JUN 10 1987

WASH OPERATIONS OFFICE

CYPRUS THOMPSON CREEK
WATER MONITORING PROGRAM

1987

ATTACHMENT #5

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CYPRUS THOMPSON CREEK WATER MONITORING PROGRAM 1987

1.0 INTRODUCTION

This document describes the Standard Operating Procedures for the collection and analysis of surface and ground water samples from the Cyprus Thompson Creek Mine. The data obtained during the years 1982-86 have been reviewed to produce this plan.

1.1 OBJECTIVES

The water quality monitoring program has been designed to obtain samples and analytical results that give true indications of the quality of mine area waters. The information obtained from the monitoring program will be used to assess the effectiveness of mitigation measures. The major areas covered by this water quality monitoring plan are as follows:

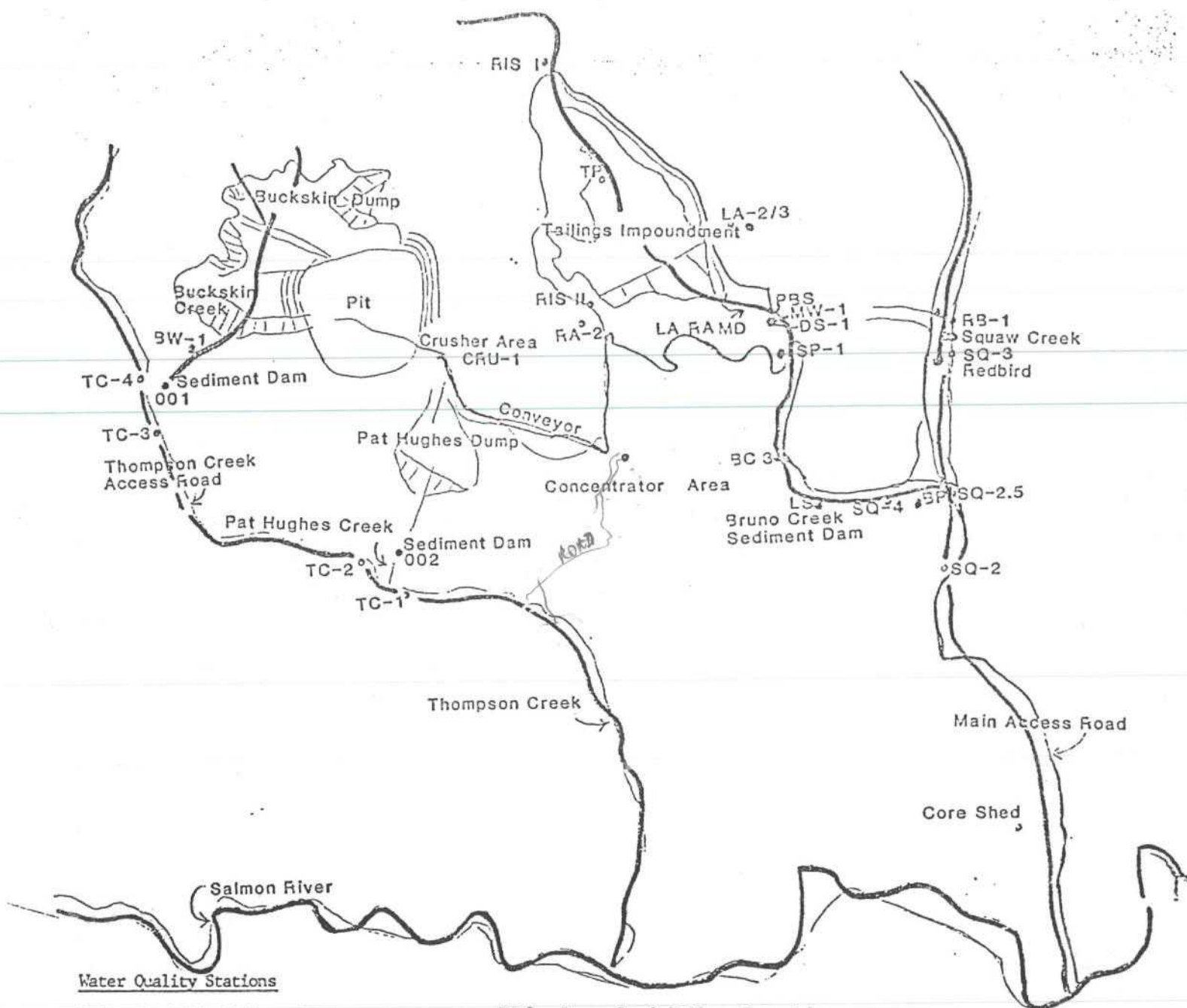
- ° Surface water quality of the Squaw and Thompson Creek drainages.
- ° Quantity and quality of effluents released from settling ponds on Pat Hugnes and Buckskin creeks.
- ° Surface and ground water quality in the tailings impoundment drainage basin.
- ° Quality of ground water developed as potable sources for workers at the mine site.
- ° Fish and invertebrate populations of streams draining the active mine and mill operation areas.

1.2 SITE DESCRIPTIONS

1.2.1 Surface Water Stations:

Surface water sites on Squaw and Thompson Creeks were chosen prior to construction for monitoring primary and secondary impacts of mining activities.

Cyprus Thompson Creek



Water Quality Stations

001	Buckskin Sediment Dam	BC-3	Bruno Creek Well at Pope John Boulevard
TC-4	Above Buckskin Creek	RA-2	Right Abutment/Tailings Well
TC-3	Below Buckskin Creek	LA-2/3	Left Abutment/Tailings Wells
BW-1	Artesian Well above Buckskin Dam	LA	Left Abutment of Rock Toe
002	Pat Hughes Sediment Dam	SRD	Seepage Return Dam Pond
TC-2	Above Pat Hughes Creek	MD	Rock Toe - Main Drain from Paddocks into SRD Pond. Center, lower weir.
TC-1	Below Pat Hughes Creek	RA	Right Abutment of Rock Toe
SQ-2	Below Guard Gate on Squaw Creek at USGS Station	PBS	Pump Back Station (below SRD)
SQ-2.5	250 ft. below confluence of Squaw and Bruno Creek	MW-1	Monitoring Well (below Pump Back)
SQ-3	Below Redbird Mine at Squaw Creek	DS-1	Down Stream Spring (below Pump Back)
RB-1	Creek above Redbird Mine/drain from west into Squaw Creek	SP-1	Sediment Pond (1/4 mile below Pump Back)
SQ-4	Above Guard Gate at USGS Station	RIS I	Upper Bruno Creek
LS	Limestone Spring Sediment Dam (above SQ-4)	TP	Tailings Pond Water (barge)
EP-1	Beaver Pond (below Limestone Spring at Bruno Creek Mouth)	RIS II	Right abutment above drop boxes
003	Beaver Pond Stormwater D.P.	DD	Diversion Ditch left of tailings

WATER MONITORING PROGRAM
PAGE 2

The following is a list of the general surface water sampling locations:

- SQ-2: Squaw Creek below the confluence with Bruno Creek and 25 feet above the second bridge above the gate.
- SQ-2.5: Squaw Creek 250 feet below the confluence with Bruno Creek (at boulder).
- SQ-3: Squaw Creek above the confluence with Bruno Creek and 100 feet below Redbird mine.
- SQ-4: Bruno Creek at the US Gauging Station (USGS) and above the guard gate.
- TC-1: Thompson Creek 250 feet below the confluence with Pat Hughes Creek and one mile above the Transfer Pump Sump.
- TC-2: Thompson Creek one-fourth mile above confluence with Pat Hughes Creek and below the confluence with Unnamed Creek.
- TC-3: Thompson Creek above the confluence with Unnamed Creek and below the confluence with Buckskin Creek.
- TC-4: Thompson Creek above the confluence with Buckskin Creek and below the confluence with Alder Creek.
- 001: Buckskin Creek sediment dam discharge point.
- 002: Pat Hughes Creek sediment dam discharge point.
- 003: Beaver Pond Sediment Control Structure - Stormwater Discharge Point on Bruno Creek.

1.2.2 Tailings Area:

Surface and ground water stations shown in Figure 2. The following is a brief description of these stations:

Surface Water Stations:

- TP: Tailings pond (barge).
- RIS I: (Upper) Head of Bruno Creek at juncture of the RIS road and one-fourth mile from the north end of the Diversion Ditch.
- RIS II: (Intermediate) Parallel with and above drop boxes at right abutment of the header line and on the RIS road.

WATER MONITORING PROGRAM
PAGE 3

RIS: (Lower) At pumpback on the right abutment.

LA: Left Abutment of the Rock Toe.

MD: Main Drain (lower, center) of the Rock Toe.

RA: Right Abutment of the Rock Toe.

DD: Diversion Ditch on left abutment above tailings line at the end of the ditch before it drops into the pipeline going to pumpback.

PBS: Pump-back system, inlet to sump on lower tailings road south of the Seepage Return Dam.

DS-1: First down stream spring 100 feet below pumpback system and 25 feet below the monitoring well on Bruno Creek (east bank).

SP-1: Sediment pond at elevation 6640 ft. on Bruno Creek, one half mile below pumpback system.

RB-1: Redbird Creek tributary to Squaw Creek one mile above Redbird Mine..

Ground Water Stations:

MW-1: Monitoring well located approximately 100 feet below the Seepage Return Dam.

BC-3: Former production well on lower Bruno Creek at Pope John Boulevard.

LA-2: Monitoring well located on the left abutment above the center line of the tailings impoundment.

LA-3: Monitoring well located on the left abutment (east upper ridge) of the tailings impoundment.

RA-2: Monitoring well located on the right abutment (west edge) of the tailings impoundment and one half mile off of the old upper mine (motivator) road.

Deleted Stations:

SQ-1: Mouth of Squaw Creek, below former construction camp.

RT: Main drain below rock toe. (Name changed to MD - new weir constructed in 1986, approximately 100 feet below old site.)

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- SS-4: SRD spring #4 located between the SRD and the pumpback system.
- SD: SRD main drain located just below the seepage return dam.

1.2.3 Potable Water Wells and Sampling Locations:

Locations of potable water wells are shown in Figure 3. They are as follows:

- CON-1: Concentrator Well #1 which supplies the administration building, the analytical lab and the concentrator.
- CRU-1: Crusher Well #1 which supplies all facilities at the crusher site.

Samples will be collected from each of the distribution systems served by these wells.

1.2.4. Other Wells

- BW-1: Artesian Well 200 feet below Buckskin Dump.

2.0 WATER QUALITY MONITORING PROGRAM 1986 - Summary of Changes

Intensive water quality monitoring of 3 streams located on the Cyprus Thompson Creek claim area has been on going since 1980. Five and a half years of data (2½ yrs. post construction) have been collected for Bruno, Squaw, and Thompson Creek. Two and a half years of data have been collected for 10 stations in the tailing area. With three and a half years of monitoring during production, parameter trends influenced by tailing deposition have been characterized.

The plan objective is to monitor for downstream detection of significant process water influence and to prevent unnecessary contamination of Squaw and Thompson Creeks. The best indicators of process water influence is a sharp or significant increase in conductivity and chloride and to a slower degree, sulfate and molybdenum. Therefore, parameters such as calcium, magnesium, potassium, sodium, fluoride, bromide and sulfide, hardness, and TDS which have already been characterized for each stream have been reduced to an annual scan of all parameters at SQ-2. They would be reinstated if and when the indicator parameters showed evidence of contamination. Process water monitoring will be conducted at one location, the pumpback system, and will continue on an annual basis for all parameters at Station TP. All downstream stations, with one exception will be retained for monitoring. The exception, SQ-1 at the mouth of Squaw Creek was originally sampled primarily to monitor

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effects of Cyprus' sewage waste water treatment facility which is no longer in service.

In general, a less intensive sampling frequency, along with a reduction in number of stations and parameters will be conducted. The nature of the program will be shifted from a water chemistry characterization program to an impact surveillance program.

2.1 SUMMARY TABLE OF 1987 MONITORING PROGRAM

(Numbers refer to accompanying tables indicating parameters to be analyzed).

<u>STATION</u>	<u>WEEKLY</u>	<u>MONTHLY</u>	<u>QUARTERLY</u>	<u>ANNUAL</u>
TP		1		1,2,3,4
MD	1	1	1	1
PBS		1	2	3
DD	5f			
LA	5f			
RA	5f			
MW-1		1	2	3
DS-1		1	2	3
SP-1		1	2	3
BC-3		1	2	3
LS	5d,f			
BP	5d,f			
SQ-4		1	2	3,6
SQ-3		1	2,8	3,6,9,10
SQ-2.5	5d			
SQ-2		1	2,8	3,4,6,9,10
RB-1			1	2,3
RA-2			1	2,3
LA-2			1	2,3
LA-3		11	11	
RIS I		1		
RIS II	5f			
RIS L	5f			
TC-1		5c*	8	1,2,3,4,6,9,10
TC-2		5c*		1,2,3,6
TC-3		5c*		1,2,3,6
TC-4		5c*	8	1,2,3,6,9,10
BW-1				1,2,3
001	5a		5b	
002	5a		5b	
BP-003-	5d			
CON-1		7a		7b
CRU-1		7a		7b

* Except when NPDES discharge point is not flowing

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2.2 MONTHLY SCHEDULE OF MONITORING PROGRAM 1987

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
RIS I (clock)	5f	5f	5f	5f	5f	5f	5f	5f	5f	5f	5f 1,2,3,4	5f
TP												
RIS II		5f	5f	5f	5f	5f	5f					
MD	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e
LA	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e
RA	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e	5e
PBS	1	1,2	1	1	1,2	1	1	1,2	1	1	1,2,3*	1
MW-1	1	1,2*	1	1	1,2	1	1	1,2	1	1	1,2,3	1
RIS L		5f	5f	5f	5f	5f	5f					
DS-1	1	1,2	1	1	1,2	1	1	1,2	1	1	1,2,3	1
SP-1	1	1,2	1	1	1,2	1	1	1,2	1	1	1,2,3	1
RA-2**	11	11	11	11	1			1		1		
LA-2**	11	11	11	11	11			11		11		
LA-3**	11	11	11	11	11			11		11		
DD		5f	5f	5f	5f	5f	5f					
BC-3	1	1,2	1	1	1,2	1	1	1,2	1	1	1,2,3	1
LS		5c	5c	5c	5c	5c	5c					
SQ-4	1	1,2	1	1	1,2	1	1	1,2,6	1	1	1,2,3	1
BP												
SQ-3	1	1,2	1	1	1,2	1,10	1,8	1,2,6	1,9	1,8	1,2,3*	1
RE-1		1			1			1			1	
SQ-2.5		5d	5d	5d	5d	5d	5d					
SQ-2	1	1,2*	1	1	1,2	1,10	1,8	1,2,6	1,9	1,8	1,2,3,4	1
TC-1	5c	5c	5c	5c	5c	5c,10	5c,8	5c,6	9,5c	1,2,3* 4,8	5c	5c
TC-2	5c	5c	5c	5c	5c	5c	5c	5c,6		1,2,3	5c	5c
TC-3	5c	5c	5c	5c	5c	5c	5c	5c,6		1,2,3	5c	5c
TC-4	5c	5c	5c	5c	5c	5c,10	5c,8	5c,6	9	1,2,3,8*	5c	5c
BW-1										1,2,3		
001(clock)	5a	5a,b*	5a	5a	5a,b	5a	5a	5a,b	5a	5a	5a,b	5a
002(clock)	5a	5a,b	5a	5a	5a,b	5a	5a	5a,b	5a	5a	5a,b*	5a
003(clock) (BP)	5c	5c	5c	5c	5c	5c	5c	5c	5c	5c	5c	5c
CON-1	7a,b	7a	7a	7a	7a	7a	7a	7a	7a	7a	7a	7a
CRU-1	7a,b	7a	7a	7a	7a	7a	7a	7a	7a	7a	7a	7a

* Quality Control Samples, See section 5.0.

** Except under hazardous conditions.

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2.3 PARAMETER GROUPS 1-10

GROUP 1
FIELD PARAMETERS

Conductivity
pH
Temperature
Turbidity

GROUP 2
IMPORTANT INDICATORS

Suspended Solids	Iron
Alkalinity	Manganese
Chloride	Molybdenum
Sulfate	
Xanthates	

GROUP 3
METALS

Copper	Zinc
Lead	Selenium
Mercury	

GROUP 4
REMAINING PARAMETERS FOR TOTAL SURVEY

Total Dissolved Solids	Aluminum
Hardness	Arsenic
Calcium	Barium
Fluoride	Cadmium
Magnesium	Chromium
Potassium	Cobalt
Silica	Nickel
Sodium	Silver
Sulfide	COD
Phosphate	Cyanide
Nitrate	

GROUP 5
SPECIAL PARAMETERS FOR COMPLIANCE

<u>5a - Weekly (NPDES)</u> Suspended Solids pH Continuous Flow	<u>5b - Quarterly (NPDES)</u> Cadmium Copper Zinc Arsenic	<u>5c - Monthly (NPDES)</u> Turbidity
<u>5d - Weekly</u> Turbidity During runoff Feb. - June	<u>5e - Monthly</u> pH and Flow	<u>5f - Weekly</u> Staff Gauge During runoff Feb. - June

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GROUP 6
STREAMBED SEDIMENTS: SEDIMENT LOAD

Arsenic	Mercury
Copper	Molybdenum
Iron	Zinc
Lead	
Manganese	

GROUP 7
POTABLE WATER PARAMETERS
(Required for public drinking water systems)

7 a - Monthly

Bacteria - Total Coliform

7 b - Annual

Arsenic	Copper
Barium	Chloride
Cadmium	Iron
Chromium	Manganese
Cyanide	Sulfate
Lead	TDS
Mercury	Zinc
Nitrate	Sodium
Selenium	
Silver	
Fluoride	

GROUP 8
MACROINVERTEBRATE SAMPLING

Identification to species, if possible; spring, fall.

GROUP 9
FISH POPULATION SURVEY

Identification to species and count; data collected in the fall.

GROUP 10

Spawning gravel sediment sampling by USFS.
8 sieve sizes for analysis of spawning gravel suitability.

GROUP 11

Water level.

3.0 GENERAL PROCEDURES - SURFACE WATER

3.1 FIELD METHODS AND MATERIALS

The following parameters will be measured in the field on site, or during winter months, as soon as possible after surface sample collection to insure accurate results.

- o conductivity and temperature
- o pH
- o turbidity
- o air temperature

Conductivity, and water temperature will always be measured instream. Air temperature will be measured on site.

The following materials will be used in sample collection:

- o conductivity meter
- o pH meter and calibration buffers
- o turbidimeter
- o sample containers with labels
- o data forms and field notebook
- o distilled water
- o cooler(s) and ice packs or cubes
- o waterproof pen
- o thermometer

A dissolved oxygen meter will be available for use as necessary.

3.1.1 Calibration Requirements:

Field equipment will be maintained and regularly calibrated according to manufacturer's instructions.

- 1) pH meter - standardization required at least once monthly. Calibration with one appropriate buffer (pH 7, 9 or 10) before each set of continuous measurements is also required. These will be recorded in a permanent log book which is kept with the instrument.
- 2) Turbidimeter - calibration to known standard required before each sample measurement.
- 3) Conductivity meter - Semi-annual calibration check to known standard required.
- 4) Dissolved oxygen meter - when in use, complete calibration required before each series of measurements. Membrane replacement is necessary generally every 2-4 weeks.

All probes and sample beakers must be rinsed with distilled water before and after each sample measurement.

3.1.2 Sample Collection, Documentation & Preservation:

Surface water samples will be collected at each station according to the schedule contained herein (section 2.1). Sample containers will be labelled at the time of collection as follows:

Cyprus Thompson Creek :
Sample Name
Date: Time:
For: (analyses required)
Preservative
Initials of collector

The general procedure for obtaining samples at each sampling station will be as follows:

- o Read staff gauge (if applicable) to determine streamflow.
- o Check battery test switch on all field instruments before use and make sure they are properly calibrated as per section 3.1.1.
- o Take an instream conductivity and temperature reading by inserting probe directly in the stream.
- o Fill sample containers, after proper labelling, by the grab sampling method taking care to avoid contamination of bottles.*
- o Take an air temperature reading making sure the thermometer is not in direct sunlight.
- o Make field measurements of pH and turbidity, by vigorously shaking the unpreserved stream sample bottle and taking a 40ml. subsample.
- o Record all information (station, date, time), measurements, and observations on the appropriate field data form (Appendix A) and sign.

* Preservation of samples will be conducted according to the recommendations outlined in Appendix B.

3.1.3 Transportation:

After sample collection, samples will be packed in ice and transported from the field to the laboratory for analysis within the recommended specified holding times (see Appendix B). The logistics of transportation will be coordinated with the testing laboratory.

3.1.4 Record Keeping:

The original copy of the field data form which also indicates sample volume collected, analyses to be performed and preservative used will be sent with samples to the water testing laboratory (Appendix A). Copies will be retained for the Cyprus files. The back of this form also provides for a lab data report to be completed and signed by the laboratory supervisor and returned to Cyprus. Copies of the lab report will be retained by the laboratory for their records.

Water monitoring results will be kept on file with the Cyprus Environmental department.

3.2 FIELD METHODS & MATERIALS - GROUND WATER

This procedure will be the same as for surface water (Section 3.1) except that

- o conductivity and temperature will be measured on site from a sample beaker.
- o well sampling apparatus (generator to operate well pump, air compressor or bailers) are required.

3.2.1 Calibration Requirements:

Requirements will be the same as for surface water (Section 3.1.1).

3.2.2 Sample Collection:

Ground water samples will be collected at each station according to the schedule contained here (section 2.2, 2.3).

Labelling will be the same as for surface water (section 3.1.2) except that

- o depth to water level using a well sounding probe will be taken before sample collection.
- o the well will be pumped for a specified time to remove from 1-2 volumes of water (volume being equal to the area of the cased well times the water depth from surface to bottom of well) before a sample is taken.
- o pumping time will be recorded and sample will be prevented from aerating as much as possible during collection.
- o in the case of drinking water wells, samples will be taken from designated faucets, after allowing water to run for 2-3 minutes.

3.2.3 Transportation:

Same as for surface water samples (3.1.3).

3.2.4 Record Keeping:

Same as for surface water samples (3.1.4).

3.3 AQUATIC BIOLOGY METHODS

3.3.1 Sampling of benthic macroinvertebrate and fish populations in Squaw and Thompson Creeks will be continued. Specific methods and materials can be found in the 1982 and 1983 reports by Chadwick and Associates, "Aquatic Biological Survey of Thompson Creek and Squaw Creek".

3.3.2 Analysis:

Invertebrates will be identified to genus and species whenever possible. Community relationships and effect of mining, if any, will be discussed.

Fish will also be identified to species and will be measured, weighed and recorded in field book.

A current copy of the USGS Report will be sent to the biologist.

3.3.3 Reporting:

An annual report will be prepared, combining the macroinvertebrate and fish population studies. This report is presented to the interagency task force for annual review.

4.0 LABORATORY ANALYSIS AND PROCEDURES

Physical and chemical analysis will be conducted by an EPA approved and state certified laboratory and/or the Cyprus Analytical Laboratory using analytical methods described in Standard Methods for the Examination of Water and Wastewater, 15th edition, American Public Health Association, 1980. See Appendix C for a list of methods used by the current laboratory contracted by Cyprus. The laboratory will comply with record keeping (Section 3.2.4) and quality assurance procedures as described in the following section.

5.0 QUALITY ASSURANCE PROGRAM

In order to produce valid water quality data from the project area, basic quality control elements will be incorporated in both field and laboratory aspects of the monitoring program.

5.1 BASIC ELEMENTS INSURING QUALITY CONTROL

- o Calibration of field instruments - covered in Section 3.1.1.
- o Proper collection and preservation of samples - covered in Section 3.1.2.
- o Time-sensitive samples will be delivered as soon as possible to be analyzed by the lab within specified holding times (See Appendix C).
- o Transfer of custody and shipment - the field sampler is responsible for proper collection, preservation, packaging and dispatching samples to the laboratory with proper sample collection forms (Section 3.1.5).
- o United Parcel Service slips will be retained for verification of shipment of samples. In case of air delivery, verification will be by telephone.
- o Custody transferred to laboratory upon delivery of samples. Laboratory is then responsible for receiving, adequately storing, and minimal handling of samples.

5.2 QUALITY ASSURANCE SAMPLING

During the course of the Water Monitoring Program, additional (standard and duplicate) samples will be utilized to determine precision and accuracy of the methods used in the laboratory according to the following schedule:

- o Each quarter duplicate samples will be taken, on a rotating basis, from one of the water quality stations being monitored.
- o EPA Quality Control samples will be procured by the laboratory on a continual basis and analyzed as a check for accuracy.
- o As an intra-laboratory check, samples may be split on a regular basis and tested again one to two times as necessary to validate results.

Quality assurance procedures and data will be fully documented and retained for future reference. Field and laboratory personnel will keep complete and permanent records of all sampling and testing to satisfy legal requirements for potential enforcement or judicial proceedings.

6.0 REPORTING

Data will be compiled and available to agencies on a monthly basis. A Yearly summary will be prepared including Aquatic report and water quality data on analysis, storm events, etc. This report is submitted to the Interagency Task Force for review.

APPENDIX A

WATER QUALITY DATA FORMS

CYPRUS THOMPSON CREEK
WATER QUALITY MONITORING PROGRAM
FIELD DATA

Station _____ Date Collected _____ Time _____
 Air Temperature _____ °F Weather _____
 Conductivity _____ umhos/cm at 25°C Sample Temp _____ °C
 pH _____ Turbidity _____ Staff Gauge _____
 Flow Rate _____
 Person Conducting Sampling _____ Signed _____
 Samples Collected: Date Mailed to Lab _____ Time _____

Analysis Group	Parameters to be Tested		Preservative Added	Collected		Sample Size
				Yes	No	
Physical Properties, Cations & Anions	Suspended Solids Alkalinity Hardness Calcium Chloride Magnesium Potassium	Silica Sodium Sulfate Sulfide TDS Xanthate	None			
Nutrients & Organics	Nitrogen-TKN - Nitrate - Nitrite - Ammonia	Phosphate Carbon-TOC	Sulfuric Acid (H ₂ SO ₄)			
Other Nutrients	BOD COD		None			
Biological	Total Coliform Bacteria Fecal Coliform Bacteria		Sodium Thiosulfate			
Trace Metals	Aluminum Arsenic Barium Cadmium Chromium Cobalt Copper Iron	Lead Manganese Mercury Molybdenum Nickel Selenium Silver Zinc	Nitric Acid (HNO ₃)			
Other Organics	Cyanide		Sodium Hydroxide (NaOH)			

Remarks:

APPENDIX B

RECOMMENDATIONS FOR PRESERVATION SAMPLES

APPENDIX B

RECOMMENDATION FOR PRESERVATION OF WATER SAMPLES

<u>Parameter</u>	<u>Vol. Req. (ml)</u>	<u>Container, Plastic or Glass</u>	<u>Preservative</u>	<u>Holding Time (3)</u>
Alkalinity	100	P,G	Cool, 4°C	24 Hrs.
Arsenic	100	P,G	HNO ₃ to pH < 2	6 Mos.
BOD	1000	P,G	Cool, 4°C	6 Hrs. (1)
COD	50	P,G	H ₂ SO ₄ to pH < 2	7 Days
Chloride	50	P,G	None Req.	7 Days
Conductivity	50	P,G	Det. on site	No Holding
Cyanides	500	P,G	Cool, 4°C NaOH to pH 12	24 Hrs. 14 Days
Dissolved Oxygen	300	G only	Det. on site	No Holding
Hardness	100	P,G	Cool, 4°C HNO ₃ to pH < 2	7 Days
Metals				
Dissolved	200	P,G	Filter on site HNO ₃ to pH < 2	6 Mos.
Suspended	200	P,G	Filter on site	6 Mos.
Total	100	P,G	HNO ₃ to pH < 2	6 Mos.
Mercury				
Dissolved	100	P,G	Filter HNO ₃ to pH < 2	38 Days (Glass) 13 Days (Hard Plastic)
Total	100	P,G	HNO ₃ to pH < 2	38 Days (Glass) 13 Days (Hard Plastic)

Appendix B (Continued)

<u>Parameter</u>	<u>Vol. Req. (ml)</u>	<u>Container, Plastic or Glass</u>	<u>Preservative</u>	<u>Holding Time (3)</u>
Nitrogen				
Ammonia	400	P,G	Cool, 4°C H ₂ SO ₄ to pH < 2	28 Days
Kjeldahl total	500	P,G	Cool, 4°C H ₂ SO ₄ to pH < 2	7 Days
Nitrate/ Nitrite	100	P,G	Cool, 4°C H ₂ SO ₄ to pH < 2	24 Hrs. (2)
Oil & Grease	1000	G only	Cool, 4°C H ₂ SO ₄ or HCl to pH < 2	24 Hrs.
Organic Carbon	25	P,G	Cool, 4°C H ₂ SO ₄ to pH < 2	24 Hrs.
pH	25	P,G	Det. on site	6 Hrs. (1)
Phenolics	500	G only	Cool, 4°C H ₂ PO ₄ to pH < 4 1.0 g CuSO ₄ /l	24 Hrs.
Phosphorus Ortho- Total	50	P,G	Cool, 4°C	7 Days
Selenium	50	P,G	HNO ₂ to pH < 2	6 Mos.
Sulfate	50	P,G	Cool, 4°C	7 Days
Sulfide	100	P,G	Cool, 4°C Zinc Acetate	14 Days
Temperature	1000	P,G	Det. on site	No Holding
Turbidity	100	P,G	Det. on site	No Holding

Appendix B (Continued)

- (1) If samples cannot be returned to the laboratory in less than 6 hours and holding time exceeds this limit, the final reported data should indicate the actual holding time.
- (2) Mercuric chloride may be used as an alternate preservative at a concentration of 40 mg/l, especially if a longer holding time is required. However, the use of mercuric chloride is discouraged whenever possible.
- (3) It has been shown that samples properly preserved may be held for extended periods beyond the recommended holding time.

APPENDIX C

METHODS USED FOR WATER ANALYSES

APPENDIX C
METHODS USED FOR WATER ANALYSES BY CODE
From Standard Methods for the Examination of Water and Wastewater,
15th edition, 1980, American Public Health Association

	<u>Method Number</u>		<u>Method Number</u>
Acidity	402	Molybdenum	303C
Alkalinity	403	Bromine	405
Aluminum	303C	Cobalt	303A or **
Arsenic	**	Nickel	303A or **
Barium	303C	Nitrogen-Ammonia	417A and 417E
Boron	404A	Nitrogen--Total Kjeldahl	420A and 420B
Cadmium	303A or **	Nitrogen--Nitrate	418C
Calcium	311C or 303A	Nitrogen--Nitrite	419
Carbon Dioxide	406A	Nitrogen--Organic	420
Chloride	407A	Orthophosphate	424F
Chlorine Residual	408E	Total Phosphate	424F
Chromium	303A or **	pH	423
Conductivity	205	Potassium	303A
Color	204A	Selenium	**
Copper	303A	Silica	303C
Cyanide	412D	Silver	303A
Fluoride	413B or 413C	Sodium	303A
Hardness	314B	Solids--Total	209A and 209B
Hex Chromium	312B	Solids--Volatile	209E
Hydrogen	427D	Solids--Suspended	209D
Iron	303A	Solids--Settleable	209F
Lead	303A or **	Sulfate	426B
Magnesium	303A	Sulfide	427B and 427D
Manganese	303A	Tannin & Lignin	513
Mercury	303F		

Appendix C (continued)

	Method Number
Temperature	212
TOC	505
Turbidity	214A
Zinc	303A
Carbonate	406C or 403
Bicarbonate	406C or 403
Oil & Grease	503A and 503C
BOD	507
COD	508A
Bacteria--Total Coliform	908A and 909A*
Bacteria--Fecal Coliform	908C and 909C*
Bacteria-Fecal Strep	910A and 910B*
Bacteria--Total	907

* Either method upon request

** Analysis by Graphite Furnance Technique EPA Method
206.2, 213.2, 218.2, 219.2, 239.2, 249.2, 270.2

This list was submitted by Analytical Laboratories of Boise, Idaho, who is currently contracted by Cyprus to perform most of the analyses.